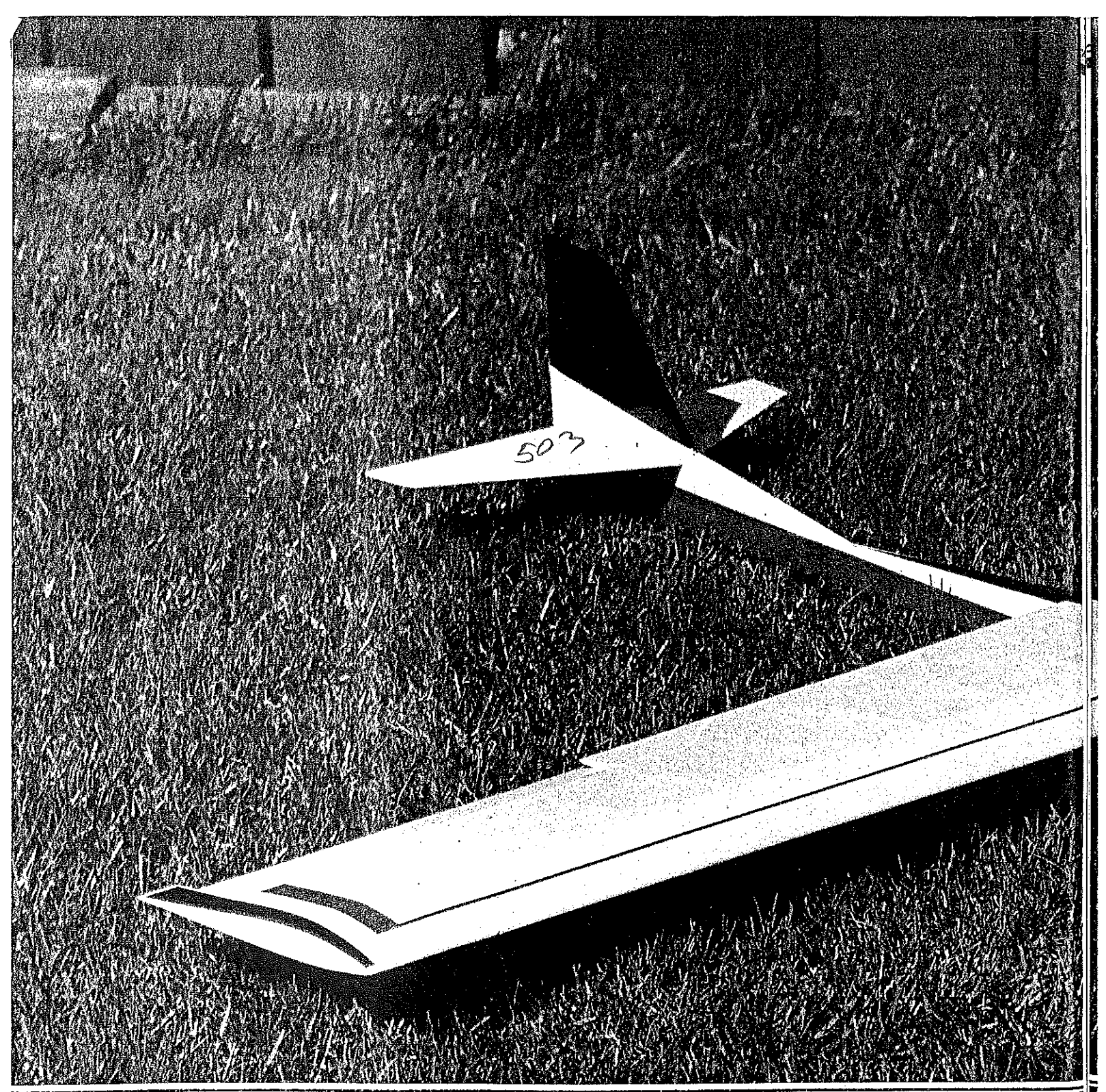
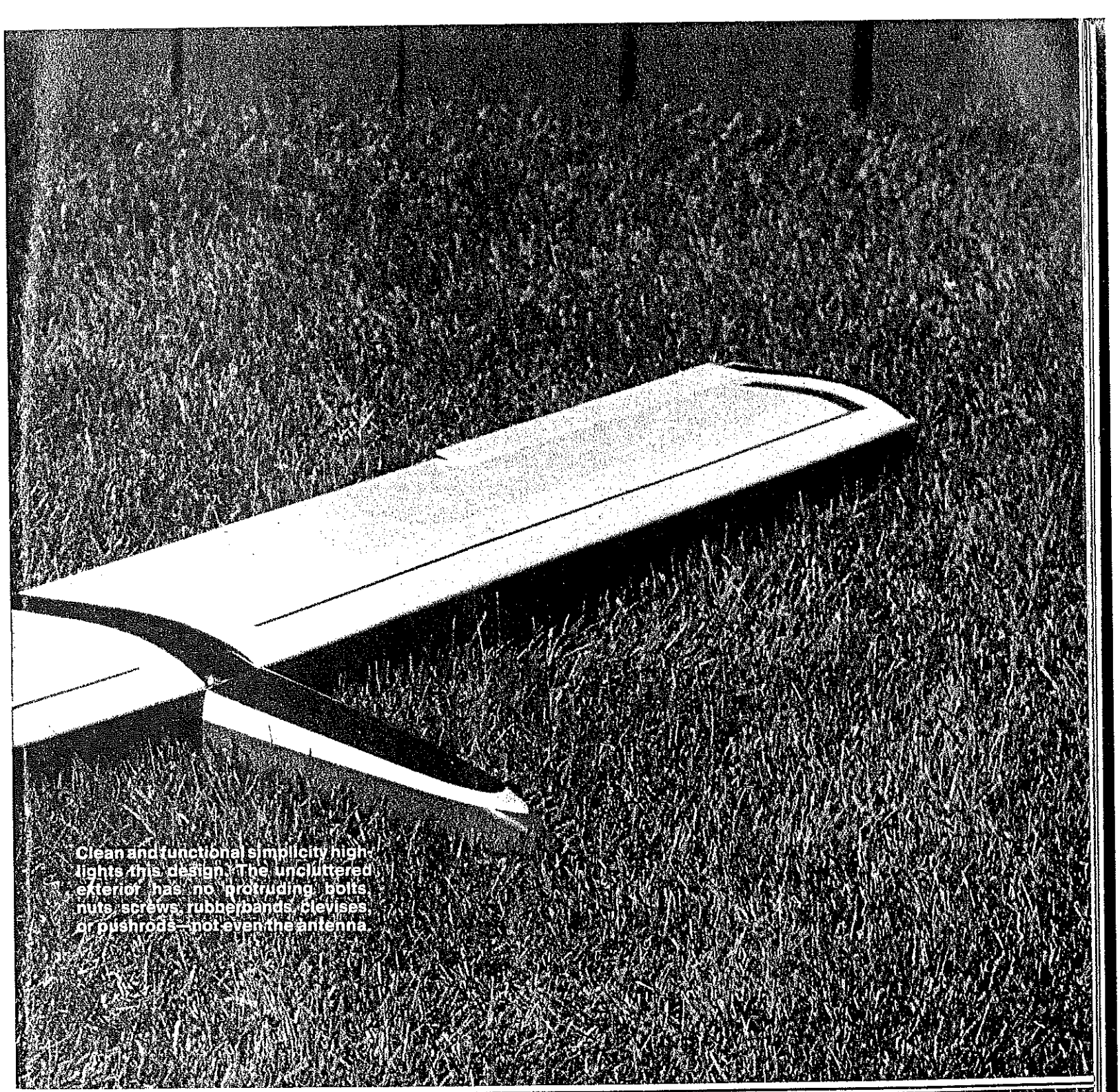
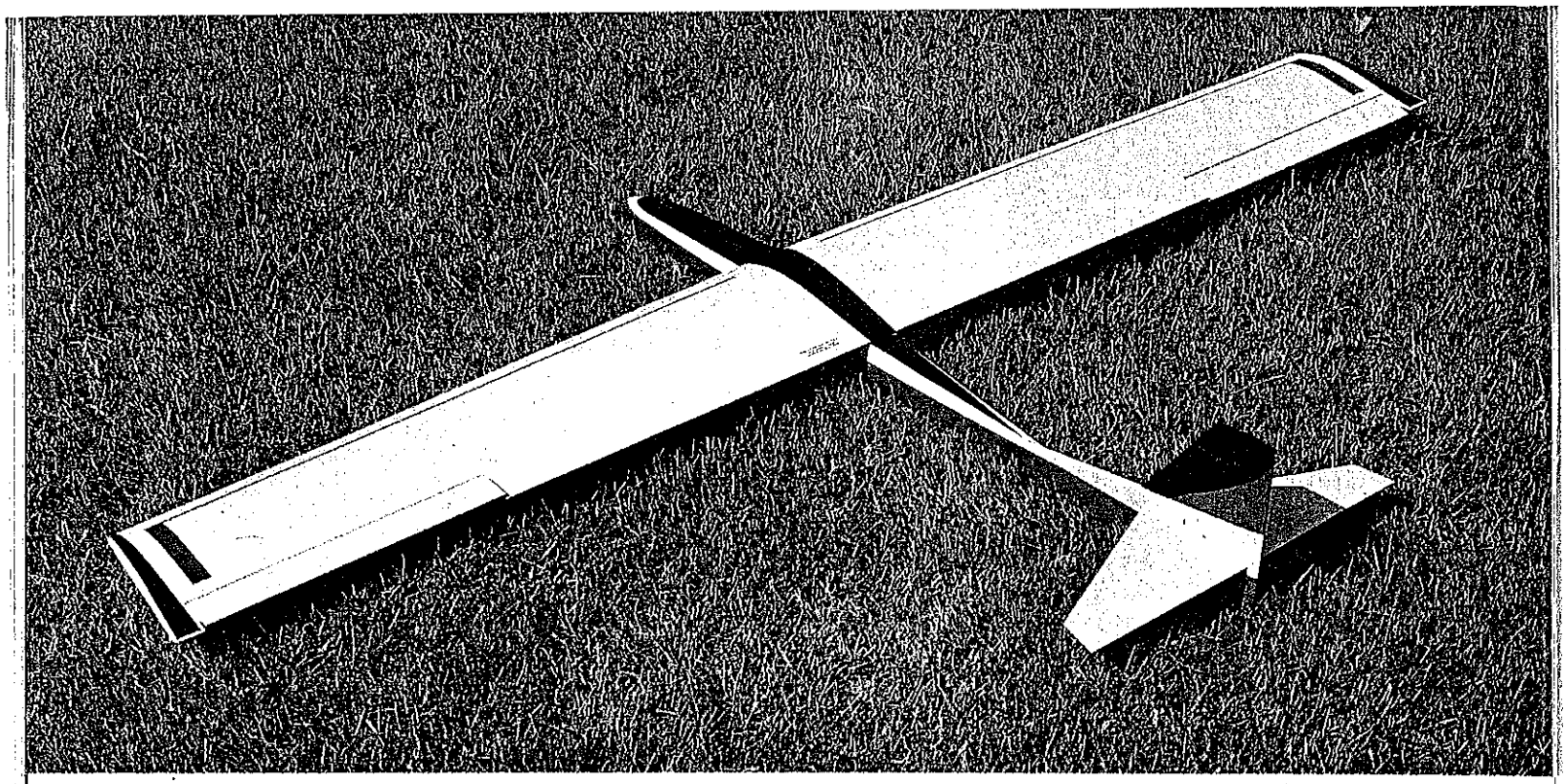


Buzzboat



Clean and functional simplicity highlights this design. The uncluttered exterior has no protruding bolts, nuts, screws, rubberbands, clevises, or pushrods—not even the antenna.

A streamlined RC Slope Soarer's high-speed runs and aerobatics seemingly without effort are breathtaking. If you have a handy hilltop with steady wind, you'll want to try this unique machine with two-channel controls. ■ **Harley Michaelis**



The fuselage incorporates special nose construction, but it is essentially a simple plywood box with balsa added to permit shaping to an oval cross section. Solid balsa tail surfaces simplify construction and airfoils sanded to symmetrical sections offer desired low drag.

THIS 5-FT. SLOPE SOARER can be easily and quickly built. It can not only tear across the sky on high-speed runs, but it can perform many aerobatic maneuvers with only two-channel controls. Inside and outside loops and spins, extended inverted flight, horizontal and vertical rolls, inside and outside tight vertical turns, blistering dives with abrupt pullouts, high-speed passes, and all kinds of showy flight are duck soup for it.

The design is distinctive and racy in appearance. It is rugged, highly functional, and especially clean. Not a single nut, bolt, screw, dowel, rubberband, horn, or pushrod hangs out. Even the ailerons can be gapless.

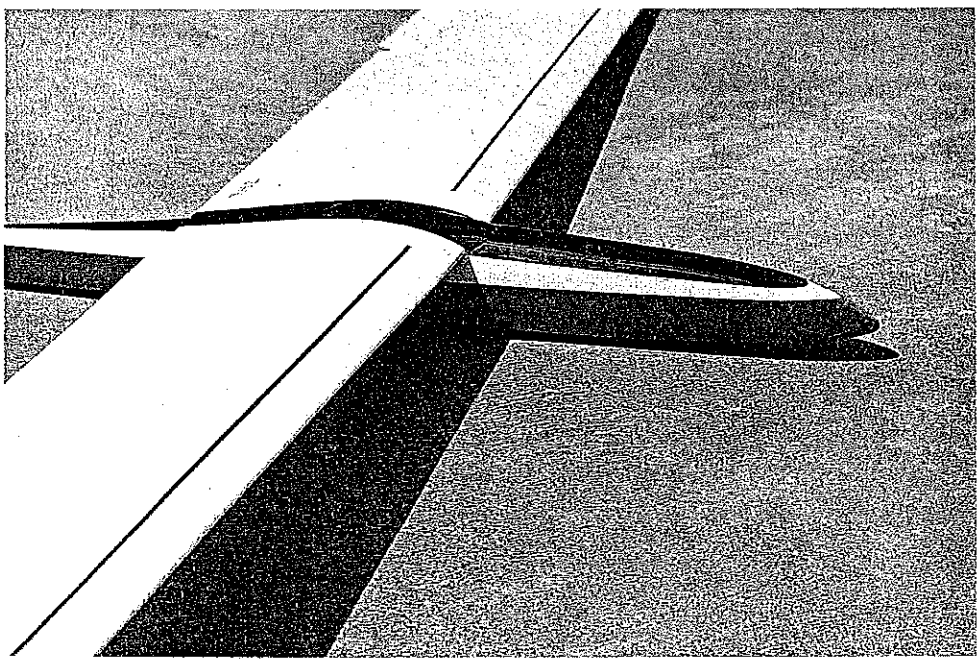
Swingee fittings are used for the ailerons, and all linkage is internal. The servo is tucked flat in the wing cavity and hooked directly to the Swingees. Ailerons are hooked up to operate differentially. Turning response on ailerons alone (no rudder) is excellent and especially tight if up-elevator is given after banking the model.

The pushrod for the flying stab is entirely internal, passing through the fin to a bellcrank for crisp action and a reliable neutral.

The wing is cleanly attached via internal hold-downs. Only two little bolt heads are visible on the bottom. However, with 5-ft. span the assembled model makes a small package easily transported to the slope site in ready-to-fly condition.

An all-up weight of 26 oz. results in a wing loading of about 8½ oz./sq. ft. A pound or more of sheet lead can be added internally to increase the loading for higher winds or the style of flying you like.

The Buzzbat will saunter around peacefully in light wind, but flying gets interesting when the lift is strong enough for down-stick pressure to be used for some real speed. At that point, you'd best not blink when you make a diving pass, or you may wonder where it went!



Hatch merges cleanly into the wing fairing. Combined with its small nose, this provides good wind penetration. Contour-type paint scheme adds to the already-sleek appearance.

Construction. You'll need the following materials. Wood is medium-density balsa unless otherwise specified.

One 3/32 x 3 x 36 for ribs.
Four 1/16 x 1/4 x 36 spruce for spars.
Two 1/8 x 3/8 x 36 for sub-leading edge.
Two 1/4 x 1/4 x 36 for leading edge.
Two 1½ x 36 beveled (1/16 x 3/8) trailing edge stock for TE and ailerons.
One 3 x 1/4 x 36 hard balsa for spar webbing from the center to R1 and for wing tip undersides.
One ½ x 2 x 36 for hatch and underbelly.
One 3 x 1/4 x 36 soft for fin, decking, top of wing tips.
One 3 x 1/16 x 36 hard for spar webbing from R1 to R9 and interior wing saddle.
One 1/8 x 4 x 36 for fuselage doublers.
One 1/8 x 3 x 36 light C-grain for stab.
Four 1/4 x 36 triangular stock for joining fuselage sides, formers, wing ribs to dihedral braces, misc.
Four 3 x 1/16 x 36 for wing sheeting, cap strips.
One 1/8 sq. hard for running antenna down fuselage.
Spruce 1/4 sq. and 1/4 x 3/8 for servo mounting.
Birch ply, 3/32 and 1/8, for formers, nose center core.

Birch ply, 1/16 x 12 x 48, for slab sides and bottom, braces, part of bottom sheeting, misc.
Birch 1/32 ply for inlays on fin.
Birch 1/64 ply for sub-decking aft of rear former.
Music wire, 1/16 and 3/32, for stab support.
Aluminum tubing, 1/16 and 3/32 I.D., for stab.
Two .055 or 1/16 x 36 music wire for aileron and stab pushrods.
Four metal clevises.
Six 2-56 threaded couplers at pushrod ends.
Two Swingees (smaller white Delrin type, if available).
One 3/4-in #4 sheet metal screws to attach front hold-down.
One 4-40 blind nut to attach rear hold-down.
Two aileron hinges (one-piece types are fine).
Three 1/2-in. 4-40 bolts with round heads.
Tap size 4-40 or 4-40 self-tapping screw.
Two Du-Bro 1/16-in. threaded ball links/sockets.
Aluminum strip, 1/16 x 3/8 in., for wing hold-downs, preferably tempered aircraft aluminum.
Thin sheet metal (tin can, etc.) for aileron servo bracket.
Nylon 1/16-in. sheet (Sig) for stab bellcrank.
Vinyl seating tape, 1/16 x 1/4 in., for wing saddle.
Brass .016 sheet for making "U" around Swingee arms.
Lead 1/16-in. sheet for ballasting (optional).

Fuselage. Make a matched pair of 1/16 ply sides. As shown, up to a 500 mAh uncased square battery pack, wrapped in 1/4-in. latex foam on the bottom and sides, can be accommodated. A 450 mAh pack, configured as on the plans, will also fit.

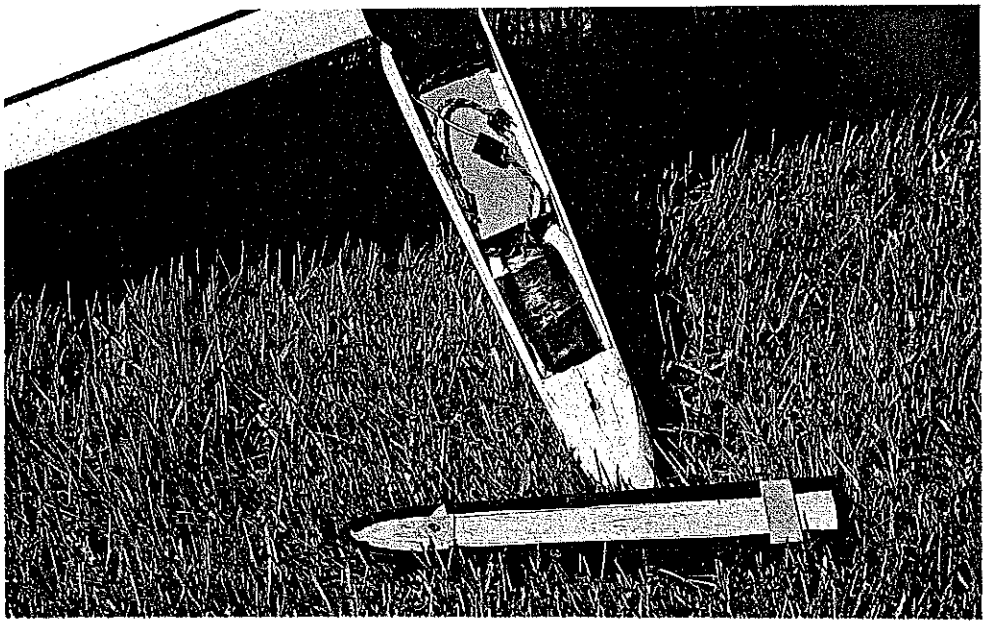
Use the root pattern to mark the wing saddle contour with the incidence shown. With the front hold-down bent as on the plans, space is left to accept a large elevator servo aft of the former. If the servo you plan to use can go forward as the plans show, bend the hold-down foot forward, notching the sides for the front crosspiece accordingly. The front former should be just wide enough to accept the elevator servo crosswise with the mounting ears on 1/4-in. rails.

Make the formers, and glue them to one side of the fuselage, then to the other, inverting the assembly for good alignment. Cut and attach the interior saddle pieces. Cut the 1/8-in. ply center core for the nose, noting it fits 1/16-in. below the top of the sides. Make a matched pair of spacers to fit against it and the sides to join the front end. Glue the spacers to the core, and trim for screw head clearance.

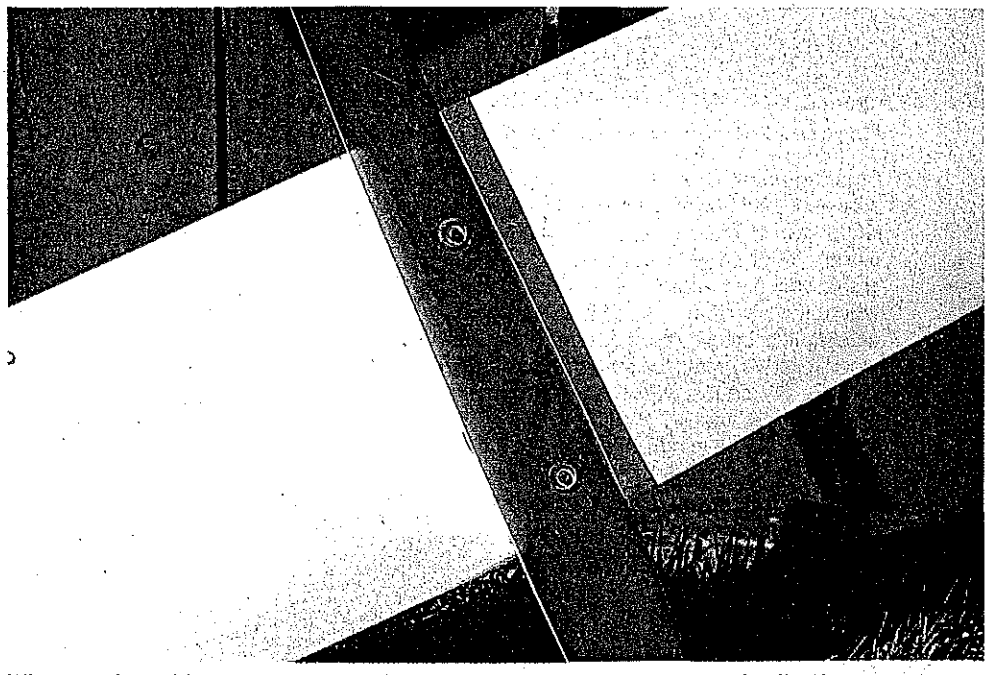
Cut the ply bottom, and mark it with a centerline. Cut 1/32 birch ply hold-down crosspieces the width of the fuselage bottom. If the servo to be used is small enough to go forward of the former, cut a rectangle to snugly accept it sideways. Depending on other space needs for your setup, it may be placed even more forward. A battery-to-receiver adapter could also be used to eliminate the bulky wiring harness.

Add triangular stock (TS) to the inside edges of the fuselage, except at the hatch and aft of the fin front. Join the nose core/spacer assembly to the sides. Glue on the bottom with crosspieces. The compartment divider is optional.

Fin. Cut out the shape, noting that it goes to the bottom of the sides. Make the bellcrank

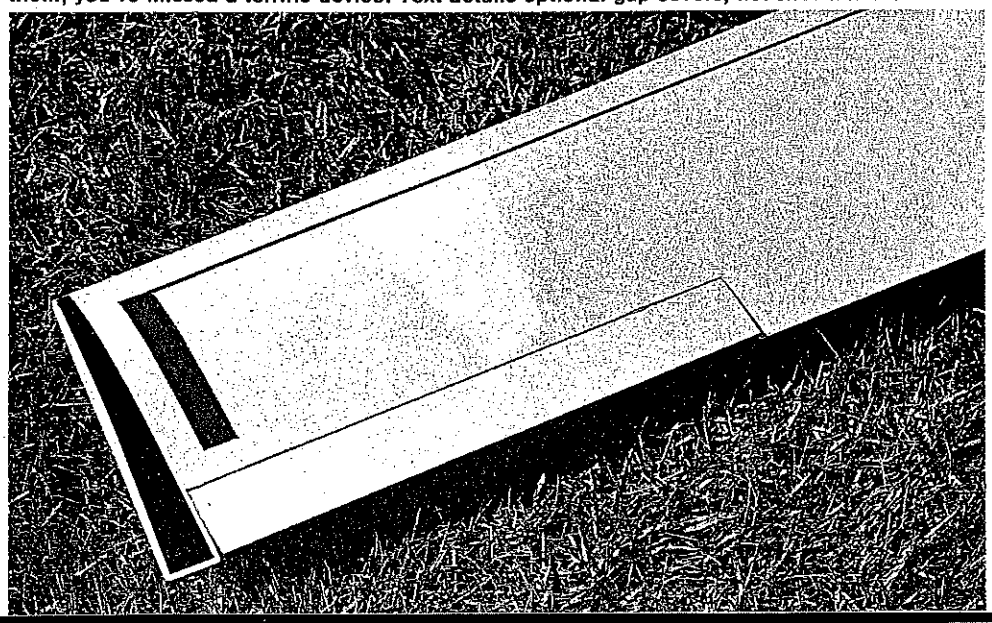


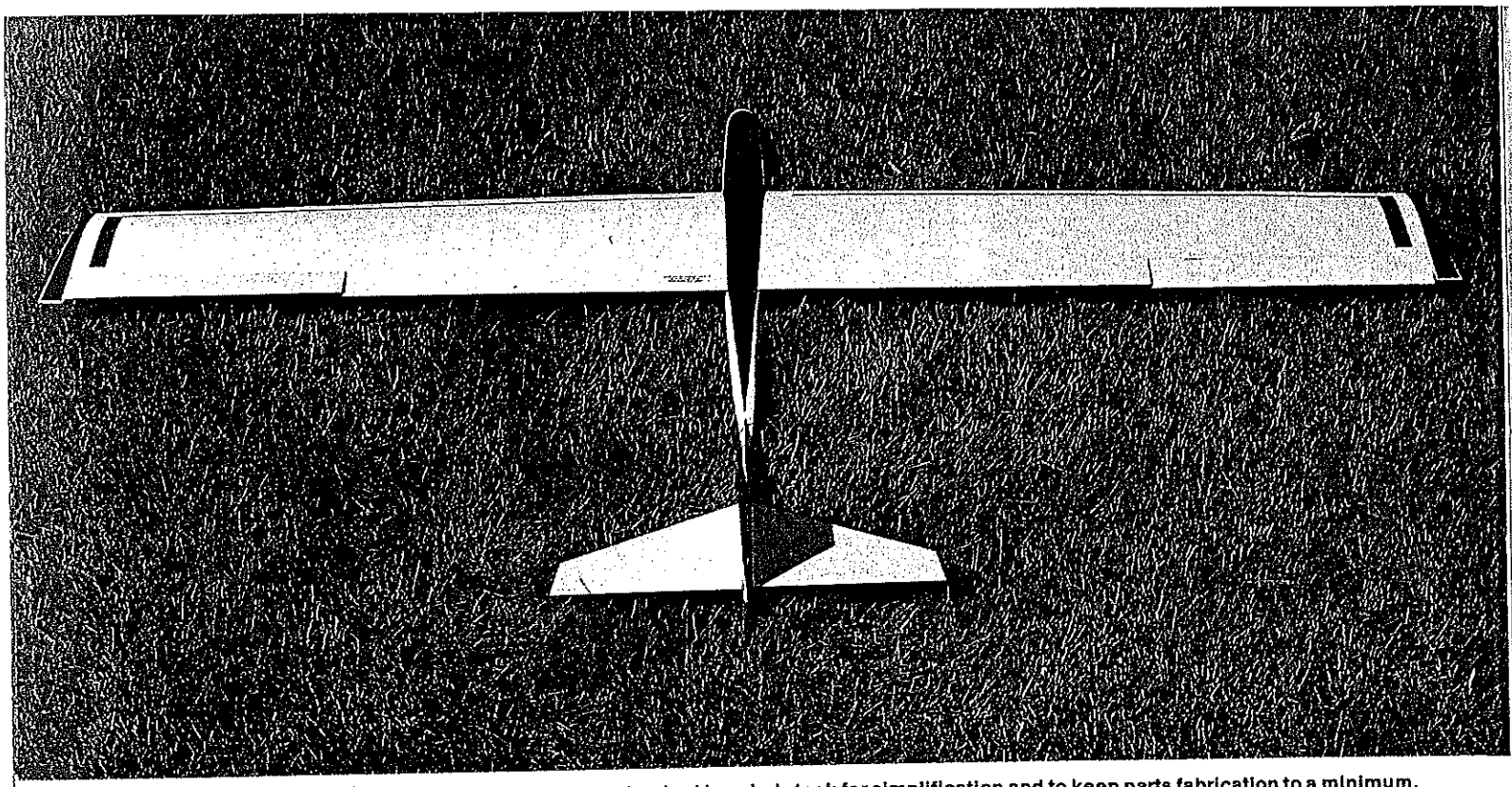
A standard 500 mAh battery pack fits into the nose. Battery-to-receiver adapter cable is used instead of a bulky switch harness. Hatch slides on and off, keys accurately to the fuselage.



Wing attaches with two Allen-head bolts as shown here. Dritz posts (a sewing item) recess the bolt heads and provide seats for them while protecting the bottom of the fuselage.

Swingee-operated ailerons eliminate external hardware. Author says if you've never tried them, you've missed a terrific device. Text details optional gap covers, not shown here.





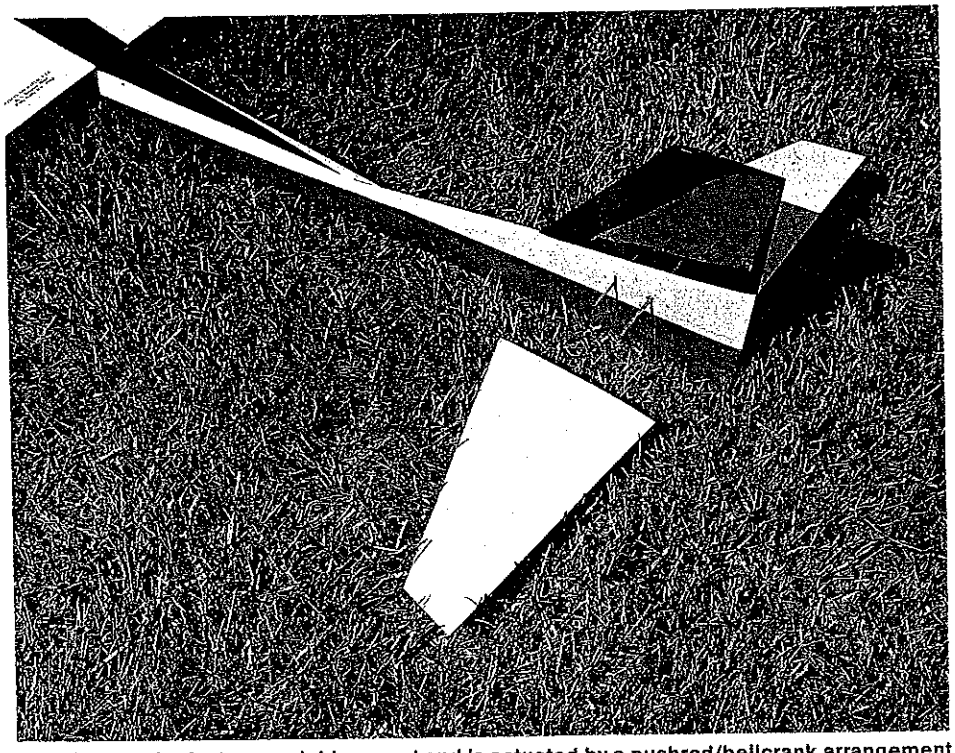
Wing trailing edge, ailerons included, is made from standard beveled stock for simplification and to keep parts fabrication to a minimum.

from Sig nylon. Use a #40 bit for the 3/32-in. wire and a #51 or #52 for the clevis for no sloppiness or binding. Make the bellcrank cutout. Trim away 1/32 in. around the bellcrank and fin bottom out to about 1/4 in. where the ply inlays go. This is easiest to accomplish before the balsa sections are glued together, using the inlays for marking. Add 1/16 ply doublers to the inlays for the main support wire.

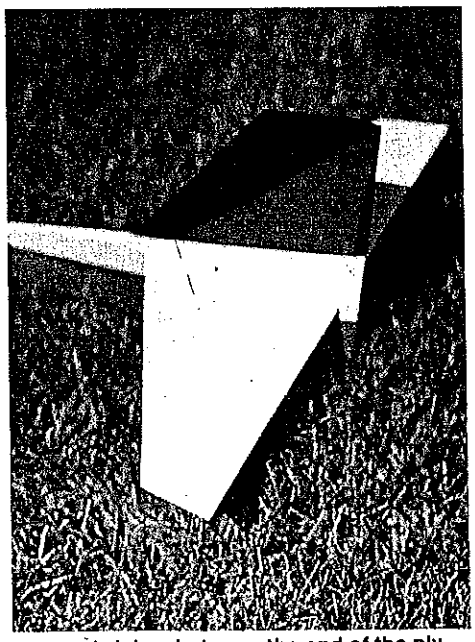
Glue on one inlay. Position the other with a 1/16-in. shim between; make keying marks, and drill the 3/32-in. hole. (A sewing thread spool with the hole shimmed down with decreasing diameter pieces of tubing makes a good drilling guide.) Place the bellcrank on the outsides, drill a series of holes in arc for the front stab connecting wire, and smooth out any rough spots. Mark the path of the pushrod through the fin to align it with the servo output arm. A common carpenter's saw can be used to cut the pushrod slot in the fin bottom. The pushrod can be made from .055 or 1/16-in. wire with threaded couplers on the ends—or with threaded rods inserted in a 1/16-in. dowel.

Assemble the pushrod, and lay it in the fin slot. Fill in underneath with balsa. Run the 3/32-in. support wire through. Glue on the other inlay, rechecking for alignment and free movement. Use Zap cyanoacrylate (CyA) to glue the wire to the inlays.

Glue the fin to one fuselage side flush with the bottom, and trim the TS in front of the fin. Clamp the fin between the sides, and eyeball and shift the fin as needed to eliminate any built-in turning tendency (ignore leaning). Zap a 1-in. length of 1/64 cross-grained ply subdecking on top just forward of the fin to secure this positioning. Glue the fin to the other side, and let the



Flying stab pivots on a rigid support and is actuated by a pushrod/bellcrank arrangement that assures a well-defined neutral. Pivot location and stab design avoid high-speed flutter.

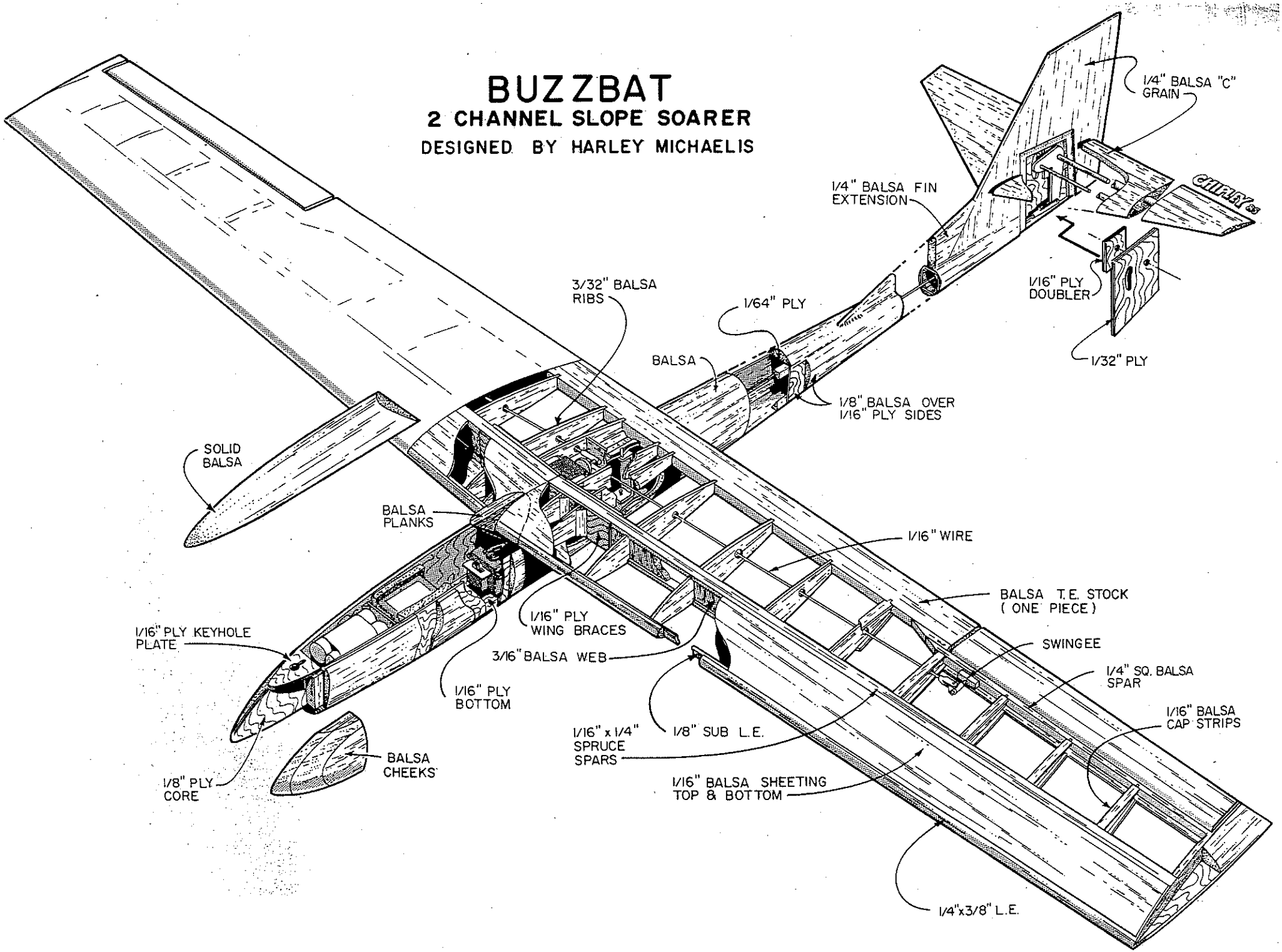


Fin sandwiches between the end of the ply sides for a slim, extremely strong rear. Stab roots fit cleanly with the flat sides of the fin.

BUZZBAT

2 CHANNEL SLOPE SOARER

DESIGNED BY HARLEY MICHAELIS



glue dry. If the fin leans, hold the fuselage between your knees, and twist it as the 1-in. sections of 1/64 ply subdecking are progressively glued on with CyA. (It's a good idea to protect your fingers with the backing from iron-on covering as the CyA "fires.")

Install the elevator servo, and complete the pushrod. At the rear former, install the crosspieces, etc., as a guide to route the pushrod clear of hold-downs. Finish the 1/64 ply subdecking, then sand the corners to make a square box.

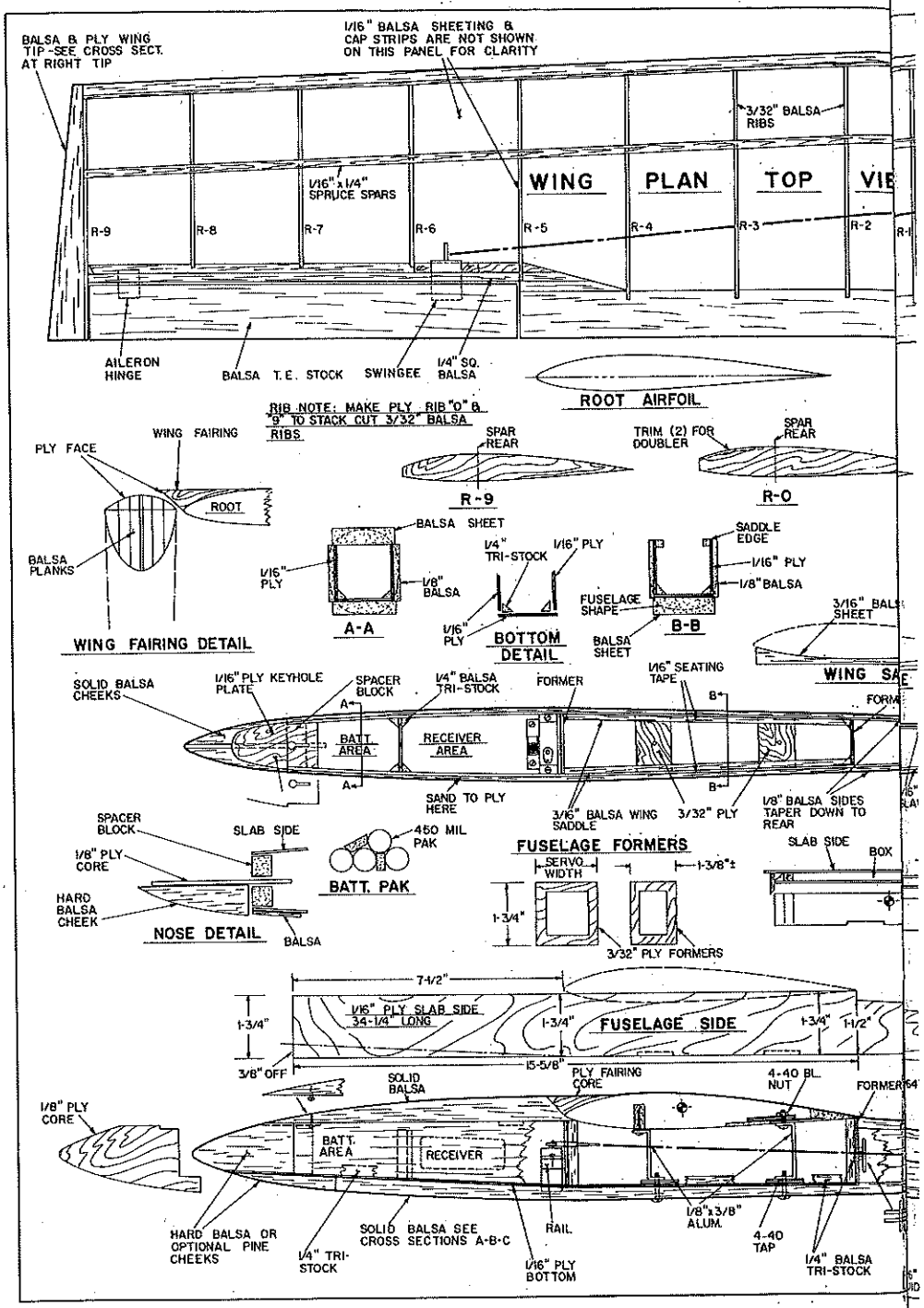
Add hard balsa or pine to the nose core and front underbelly. Add sheet stock to the ply box structure for shaping the fuselage, using lighter balsa at the rear. Cut the hatch block to profile and to the sides of the fuselage. Glue 1/64 ply to the bottom edges and to where the hatch hold-down screw goes. Fit the dovetailed 1/16 ply plate atop the spacer blocks and between the sides. With the hatch block in position, drill through it and the mounting plate to establish a common centerline of the screw and rear of the keyhole slot. Set and adjust the screw in the hatch; punch pinholes in the balsa around it, and thoroughly reinforce the area with thin CyA glue.

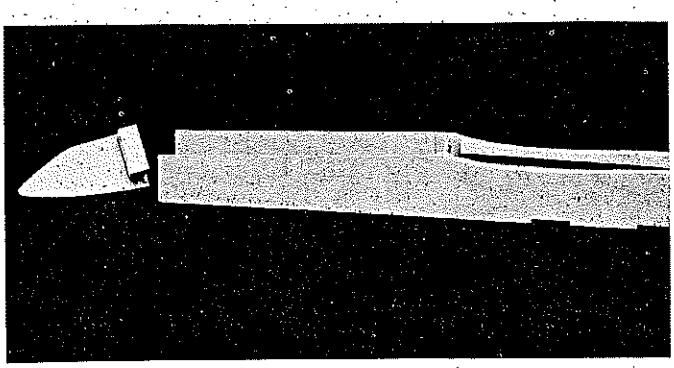
Make a keyhole slot in the plate, then glue it in place. Add the keying plate to the hatch rear underside. Sand down to the ply box corners, except along the saddle edges. Merge to the 1/16 ply along the hatch area, simultaneously shaping the hatch. A razor plane and flat Permagrit tool are excellent here to aid in forming nice oval cross sections. Cut and glue on the fin extension so it is slightly above the line of the stab. Work the fin generally to a symmetrical airfoil, but keep it flat where the stab butts it.

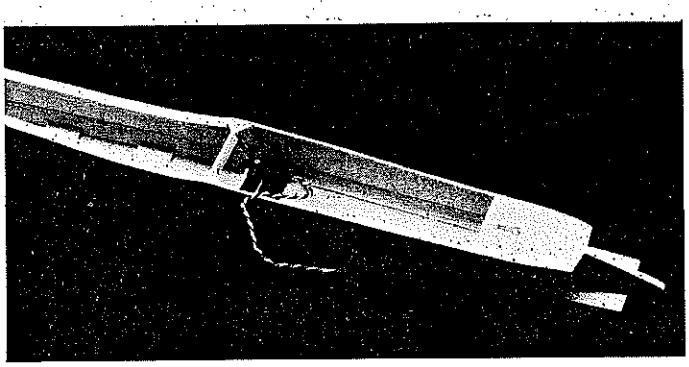
Stab. Cut from 1/8-in. balsa, preferably light to medium C-grain stock. Lay against the fin in the correct position, and mark where the 3/32-in. I.D. tubes go. Cut snug slots, and press the tubes in. Slip the halves on, and make snug slots for the 1/16-in. I.D. tubing. Shift the stab halves in the slots until they are in the same plane and aligned well with the wing saddle.

Use a tiny drop of CyA to secure the tubes in position. Remove, add more CyA, and fill around the tubes with epoxy putty, etc. Shape to a nice symmetrical airfoil, thinning toward the tips. Reinforce and harden thin edges with an application of thin CyA.

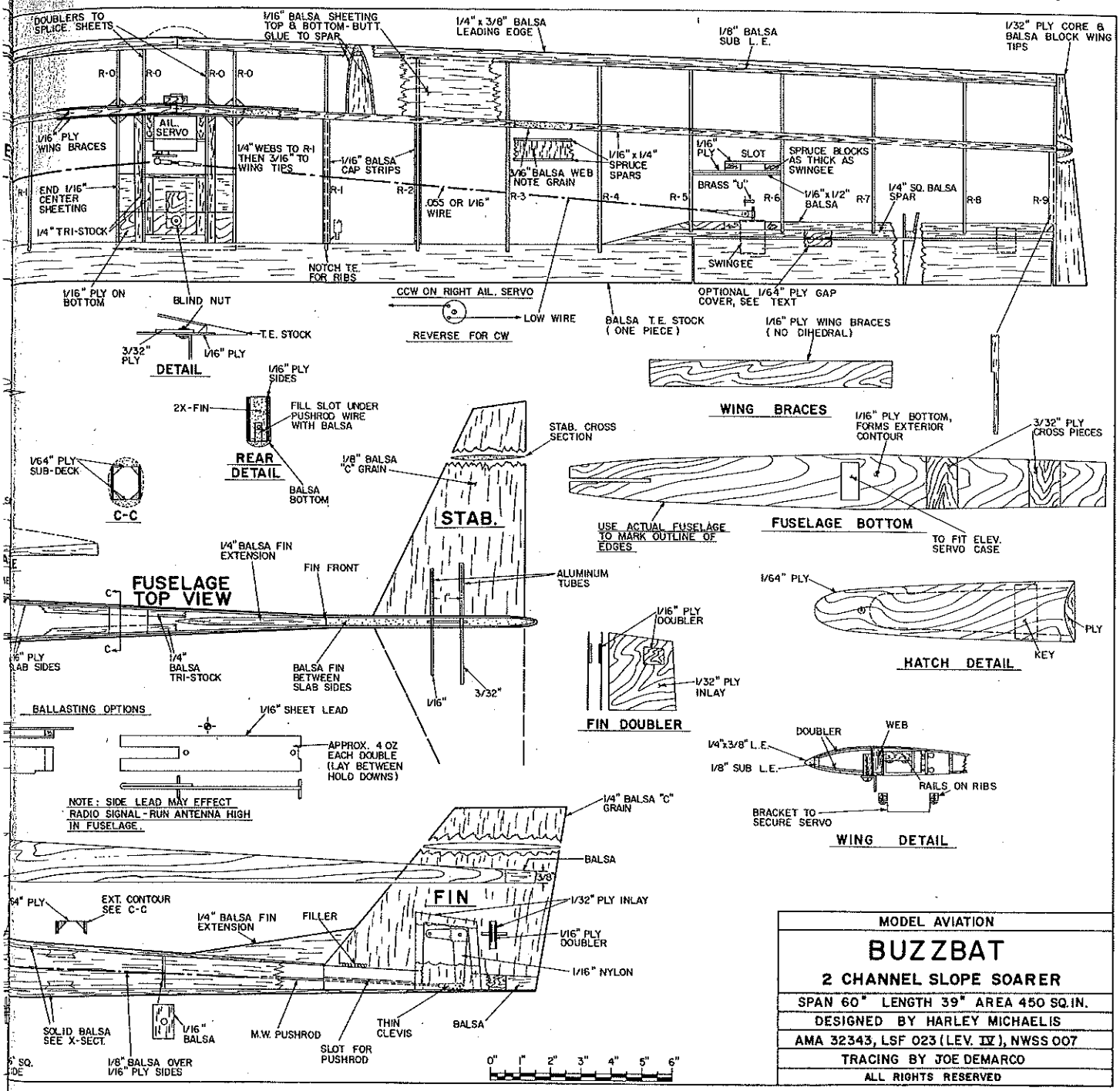
Position the stab servo, and adjust the output so the pushrod clears the hold-downs. Adjust the stab so that 0-0 (neutral) is in line with the bottom of the fuselage.







Left: In this shot, the interior saddle pieces are already in, and the 1/16 ply sides are joined with formers. Ply nose core/spacer is glued onto the front end. Right: Bottom and crosspieces of 1/16 ply are then glued to the sides, and triangle stock is added for reinforcing. The hatch keying plate has already been glued in place. Elevator servo is recessed in the fuselage bottom and will be attached to mounting rails.



MODEL AVIATION

BUZZBAT

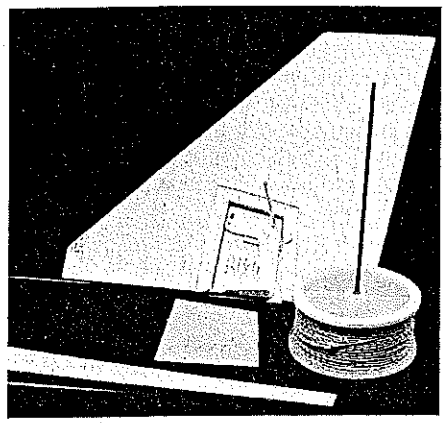
2 CHANNEL SLOPE SOARER

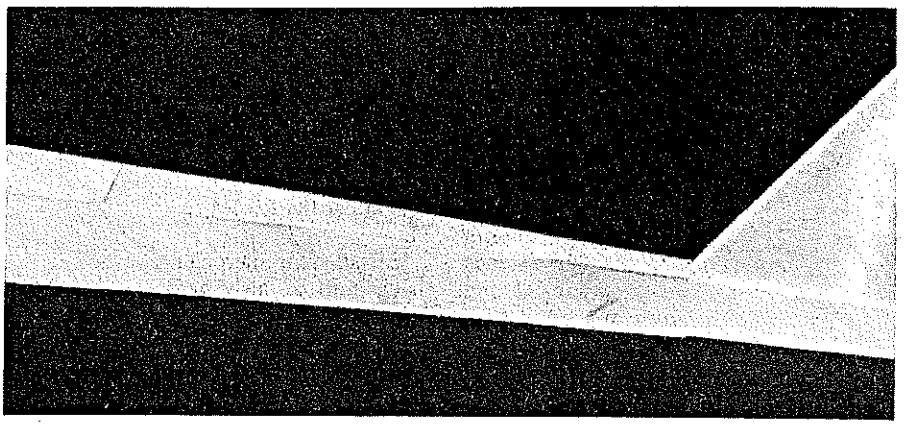
SPAN 60" LENGTH 39" AREA 450 SQ.IN.

DESIGNED BY HARLEY MICHAELIS

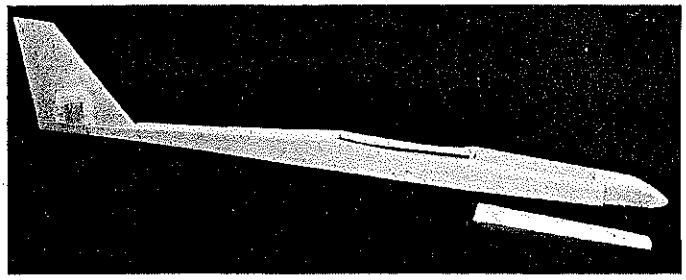
AMA 32343, LSF 023 (LEV. IV), NWSS 007

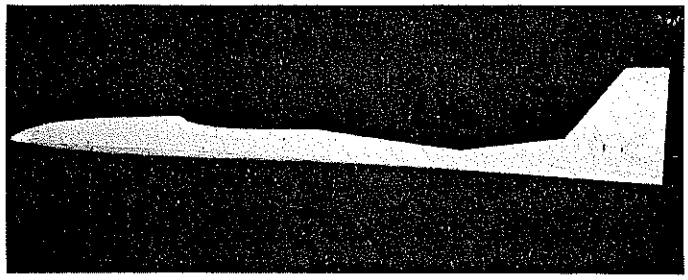
TRACING BY JOE DEMARCO



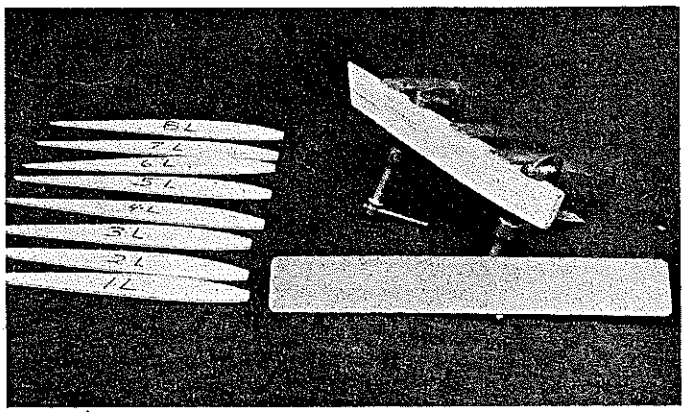


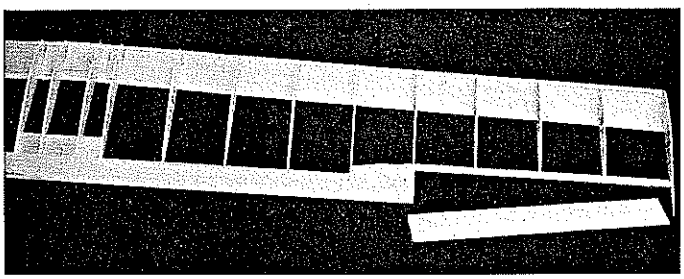
Left: A cutout is made in the fin for the stab bellcrank, and it is slotted underneath to accommodate the pushrod. The 3/32-in. stab wire is rigidly supported in the ply inlays/doublers. The shimmed spool serves as a drill guide. Right: The fin is glued to the slab sides, and 1/64 ply subdecking is then added to the top and bottom to form a ply box. It is rugged *and* very light, and enclosed hardware greatly reduces drag.



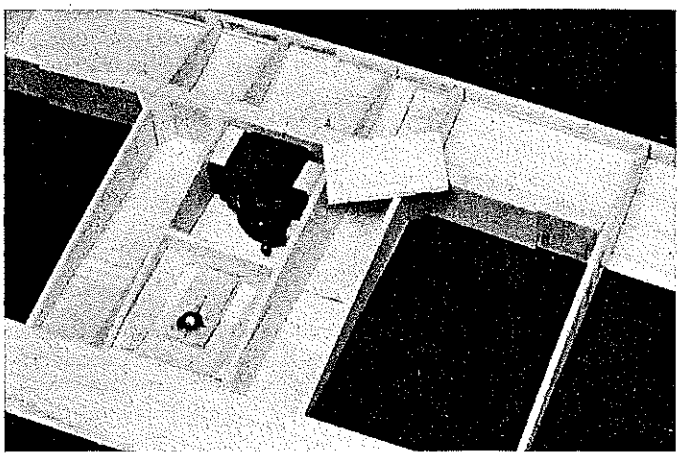


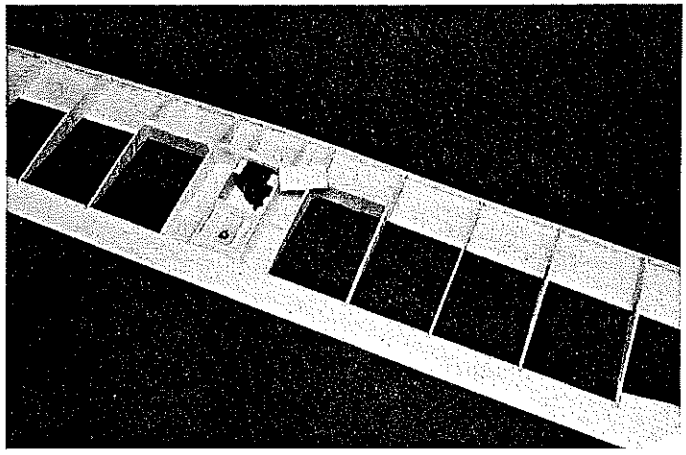
Left: Balsa planks and blocks are added to the ply fuselage box, and the keyed hatch is installed so that it can be shaped along with the rest of the fuselage. Right: Balsa sheeting is worked with a razor plane and sanding block to oval cross sections to the ply box corners. Keep working until a nice sculptured shape is achieved. Model Magic Filler was used by the author to fix gaps and dings and to make fillets.





Left: Ribs 1-8 are shaped with a Permagrit file from balsa rectangles clamped between plywood templates of R0 and R9. Spruce spars butt-join the sheeting, eliminating rib notches. Above: Wing builds flat—no dihedral. Ribs are notched into the stock-size beveled trailing edge, also used for the ailerons. Ribs are first tacked to the spar with CyA and then, one by one, are glued to the sheeting with CyA.





Left: Here the ¼-in. vertical webs, plywood braces, and blind nut have been installed. Servo rails will be capped with balsa to center the output wheel vertically in the cavity. Installing 3/16-in. webbing out to the tips is next. Right: Simple wing construction cuts building time.

Wing. The flat Permagrit sanding tool is especially useful in forming rib templates and the 3/32 balsa ribs. Make R0 and R9 templates from 1/16 ply. Use them to cut four R0 ribs and two R9 ribs. Clamp eight rectangles of balsa between the R0 and R9 templates, and stack-shape R1 through R8. Reverse the templates, and repeat the procedure for ribs in the other wing half. Level the rib tops, and trim 1/16-in. off the top edges of the innermost R0s forward of the wing brace.

Cut 1/16 x ¼ spruce spars and bottom sheeting. Note that the sheeting extends forward for the ⅛-in.-thick sub-leading edge. Butt-glue the spars to the sheeting, except where the vertical front wing brace goes. Trim 1/16-in. from the sheeting there to allow for the brace. Pin the sheeting and ribs to your work surface, and make a line with a ball-point pen to represent the rear of the sub-leading edge. Shape and fit the solid trailing edge (TE) stock to extend out to the R5 rib stations. Note that the underside is trimmed to the outermost R0s for the inlaid 1/16 ply plate.

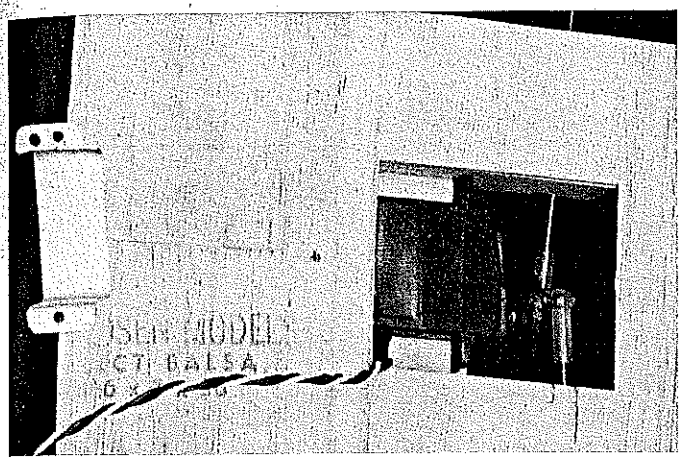
A mini or micro servo and output wheel with offset holes is needed for the ailerons. Space the inboard R0 ribs to fit the servo on ¼-in. rails.

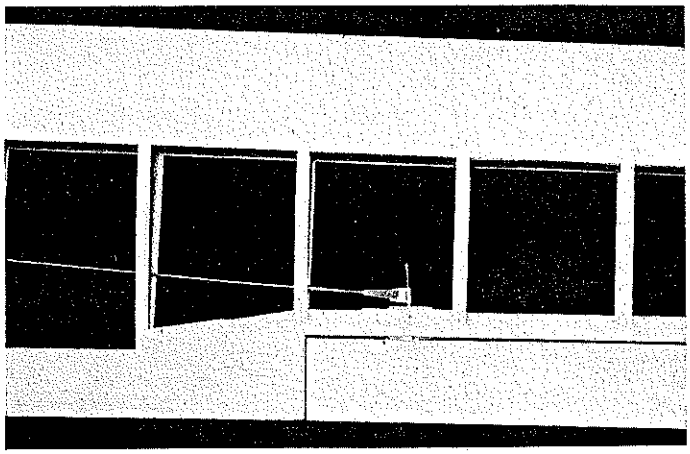
Cut ¼-in.-deep notches in the TE for the ends of R0 to R4. Trim these ribs accordingly. Pin the TE in place with a 1/16-in. shim strip under the R0-R4 ribs, and Zap in the TE.

In front of the aileron line, pin down a ½ x 1/16-in. strip of fairly hard balsa. A ¼-in. balsa spar strip for hinging will later be added to the rear half of this. For now, glue ribs from R5 on out to this piece. Cut 3/32-in.-deep notches in the spar strip for the ribs. Bevel the spar strip to match the airfoil, and glue it on.

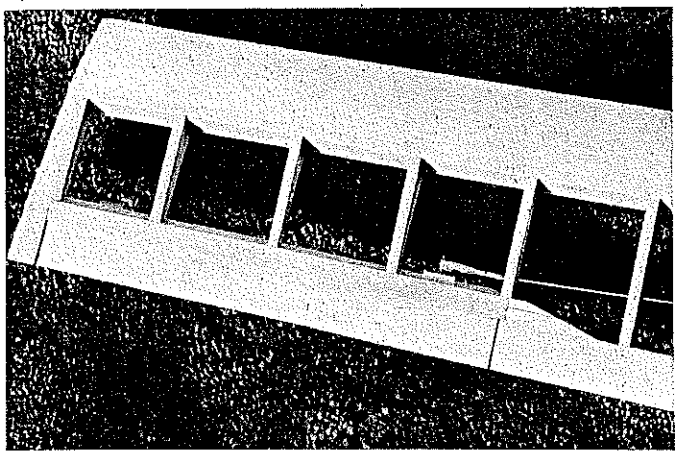
Swingees should be handpicked for ones that move freely and have minimum sloppiness in the arm when all the other parts are held flat. To install them, glue a 5/16-in.-wide strip of 1/16 ply (use 3/32 ply for the thicker Swingee) onto the ½-in. balsa aileron mounting strip, aligning it against the spar front between the ribs where the Swingee will lay. Use a #11 blade on the ply to cut the slot bottom, then use the Swingee as a guide to cut the top, then the sides, for a snug fit. Cut a pair of spruce blocks ½-in. long from a ¼ x ⅜-in. strip. Trim to match the Swingee thickness.

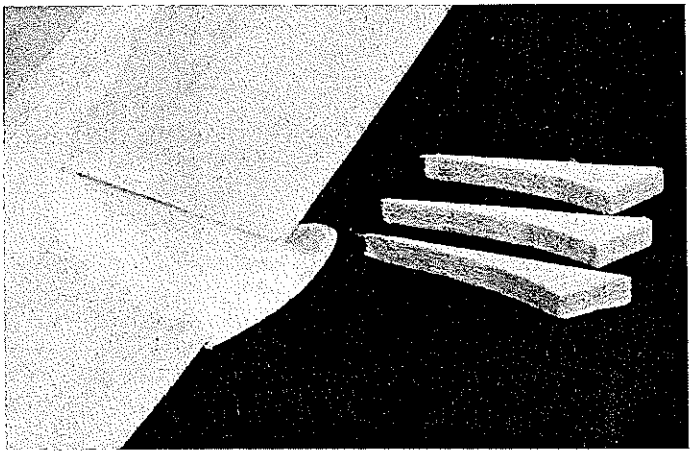
Insert the Swingee, and glue blocks to the ply to form the front portion of the slot sides. Remove the Swingee. Cap with a strip of 1/16 ply to complete the slot. Drill 1/16-in. holes through the center of the ply. With the Swingee hinge line close to the structure, drop CyA into the holes to secure it, taking care to avoid bonding the moving parts. Shim a 1/16-in. drill bit, and drill a slot



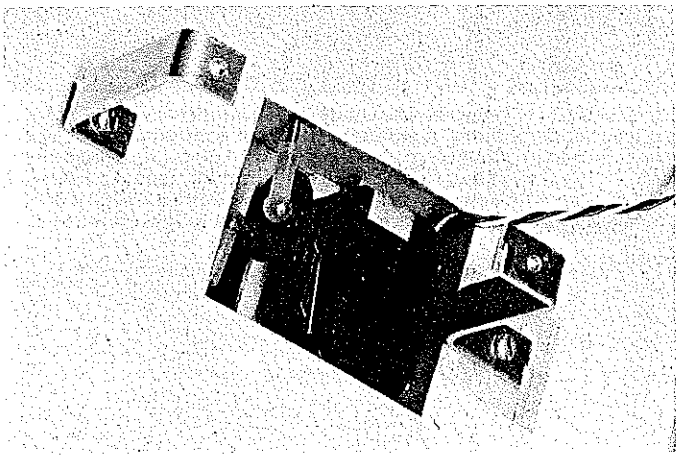


Left: An aluminum bracket secures the servo to the rails. The 1/16-in. ball links are offset in the output holes to provide aileron differential. Right: A brass strip around the Swingee arm receives the metal clevis. The Swingee is blocked in with spruce and ply and glued with CyA.





Left: Optional 1/64 ply covers the aileron gap in this view. The underside is slit, and a rubber cement bead is added. When the cement cures, it acts as a hinge when the slit is cracked. Right: Wing fairing has a ply core and balsa planking. Hatch slides beneath it for streamlining.



Left: Tapered aluminum hold-downs are secured to the wing and are part of the secret about how the wing is held on with only two visible screw heads. Right: Our author launches the Buzzbat for another flight. Low drag makes this ship a good performer even in light winds.

in the aileron so the arm is straight forward with the aileron in neutral. Use 1/64 ply to shim up the slot if necessary. Most any type of hinge (Radio South, etc.) is good for the other locations.

From a ¼-in.-wide brass strip, crimp U-fittings around the Swingee arm threads. Trim and smooth to a matched pair. Out 3/16 in. on the U-fitting, make a hole for the clevis pin sized to neither bind or be sloppy. Place as close in as possible on the arms for maximum deflection. Use a metal clevis with keeper here, instead of the nylon type. Aileron trimming will be made by rotation of the entire pushrod at the ball socket end.

Zap-glue the ribs one at a time to the spar and the sheeting while maintaining pressure against the rib bottoms. Check the rib fronts and tops with a straightedge, and sand down or build up as necessary to achieve uniformity. Put a 1/16 balsa doubler at the front center of the bottom sheeting to splice the wing halves together. Add 1/16 sheeting over the tops of the R0 ribs to splice the top center sheeting.

Cut and add all vertical webbing and the sub-leading edge. Cut 1/16 ply braces to go from the wing bottom to under the top sheeting. Trim 1/16-in. from ribs forward of the webbing, and glue in the brace, all flush with the work surface. Rejoin the sectioned ribs with TS bracing. Add a block through the sheeting to attach the front hold-down screw. The block must be of sufficient size/strength for the screw to get a good bite, as it supports most of the model's weight and G-forces. Add the top spar and sheeting, then the rear brace. Add and shape the leading edge.

Fit and glue in the 1/16 ply plate to which the rear aluminum hold-down fastens. Drill

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Letters to the Editor

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authorized to report on Bill's demise is George L. Eaton, AKA C.S. Verral, who now holds the copyrights to Bill's future.

Bill Barnes killed in an automobile accident? No way! The next thing I know, you will try to tell me that Glenn Miller was killed in a plane crash!

Bill Barnes lives!

Bud Overn
Santa Ana, CA

Great men like Barnes are legends. Bill was "seen" at a gas station in Elcino, a Lake Charles Nats, and a Safeway supermarket in North Platte. Truth must be faced. On that fateful day in 1952, the great pilot foolishly ventured out in a red Volkswagen van in near-hurricane conditions. His demise was covered up by the CIA due to a planned highly-sensitive mission to the Near East which could have brought lasting peace to the region. Even *The New York Times* reluctantly deleted his obit. Since Frank Tinsley, retired, was happy as the mayor of a New England town, friends hid news of the sad event which would have broken his heart. Yes, that party in a New York town house was reported in the papers. Bud Overn may not be aware that Barnes had an identical twin; perhaps it was he who thwarted the Japanese in the Aleutians. Until that secret file at the Pentagon is declassified, my lips are sealed.

Shorty and Sandy at the party? One might see things after the happy consumption of that colorless, odorless liquid with olives on toothpicks. A butler whispered to the man from the *New Yorker* that, for old time's sake, the Russian-like liquid was actually the Barnes secret engine coolant drained through loaves of white bread (Pepperidge family size) stood on end to remove any toxic agent. Perhaps it will be news to Bud that the real Sandy *always* wore a green silk shirt, the first three buttons open to reveal a tatoo of the Stormer. His Sandy wore a polka-dot tie that night—doesn't square. Having been visited by a soft-spoken FBI type, and that still-secret file, I can say no more. Editor-Publisher Wheeley has been firmly advised by that same operator not to publish another word about Barnes. The case is closed.

Since I personally edited Chuck Verral's copy (as George L. Eaton), I will sign an affidavit that Chuck shared that chore on an alternate-month basis with Harold Montanye. Bud Overn and Chuck, and all the others, will be remiss if Monty is forgotten. He was my pal. Bill playing tennis? Gosh, even Chuck can't tell the brothers apart!

Bill Winter
Fairfax, VA

When responding to advertisers, mention that you read about them in *Model Aviation*.

Buzzbat

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a hole for the 4-40 blind nut near the plate front, dead center of the wing. Make the rear hold-down, bends somewhat rounded. If available, use tempered aircraft-type aluminum. Center punch the bent ends out at about 3/16 in., and drill 3/32-in. holes. Tap for 4-40 threads. Temporarily attach the hold-down, and set the wing in position on the saddle.

Mark where the hole in the fuselage bottom is to be drilled. Repeat for the front hold-down. If the foot was bent forward to accommodate the servo, locate the front hole by making a template of scrap balsa to match the hold-down hole spacing. Lay the template on the fuselage bottom, and mark it. Drill holes with the fuselage resting firmly on a block. When making final installation of hold-downs, glue the notched ply plates to the wing around them so they can't rotate.

Extend the bottom sheeting toward the aileron servo to minimize the open area (to be enclosed by the fuselage). Cut a 5/8 x 1¼-in. piece of 1/8-in. birch ply, and glue it, centered, inside to extend over the ply plate and adjacent bottom sheeting. Drill through for the 4-40 blind nut. Attach a 1/8-in. balsa vertical crosspiece aft of the servo.

Add TS in all places where the ply plate and other bottom sheeting meets other

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Buzzbat

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structural members. The most common damage from a bad landing is the ply plate's breaking away. Add the remaining top center sheeting, cap strips, and the extreme tips. The ply facing for the wing fairing can be shaped while tack-glued to the hatch rear, then broken away and glued to the leading edge while the wing is mounted. The remainder of the fairing is then fitted. Magic Model Filler can smooth everything out. Temporarily add 1/16-in. seating tape when adding the facing—to get a good merge between the hatch and fairing.

Aileron servo installation. Rails are glued to the inside of the inboard R0 ribs positioned to center the servo output wheel vertically in the cavity. A metal bracket screws over the servo case from the underside. A cutout in the sheeting over the servo wheel gives 1/16-in. more space there.

Butt the servo bottom against the rear brace, flopped so the cable best clears the front hold-down. Aileron differential (more up than down) is provided by placing 1/16-in. ball links in offset holes in the output wheel. Try 45° to get at least twice as much up as down to avoid adverse yaw.

Use a hole radius of at least 5/16 in. to get enough aileron movement. Servo-to-Swingee linkup, as the plans show, applies to the small white Swingee. One control wire will run high and one low to the ball links at a side of the wheel. If the bulkier dark opposing Swingees are used, both ball links can be on top or bottom of the wheel, preferably the bottom for easier access. Study the servo rotation and corresponding Swingee action from the plane's rear with the radio on to observe what's happening. As it turns, linear movement for up-aileron must be greater.

Tape the ailerons in neutral. Mark and cut paths of holes for the pushrod wires through the ribs. Use a coupler with sufficient threads for adjustments, and solder the coupler to the wire at the aileron end. Put on a metal clevis, centered on the threads, and use a keeper. With radio on and output wheel in neutral, sockets on the couplers, mark where the wires are to be cut at the servo end to go deep into the couplers. Cut and epoxy the wires in the couplers.

To avoid bonding Swingee parts, secure the rear portions with CyA dropped through small holes made in the balsa.

Optional aileron gap covers. An idea for better gap covers than the 1/64 ply referred to on the plans came to me after the plans were inked. After covered ailerons are installed, cut a 3/4-in.-wide strip of thin, rigid plastic (3 mil clear drafting Mylar is excellent) and attach with 1/2-in.-wide double-sticky clear Scotch tape. These can be external or under the covering of the wing if low heat is used. Static electricity requires a clean environment and the following steps.

First, tape the 3/4-in. strip, cut to length, to the work surface with bits of black tape placed on one edge. Then stretch and carefully lower in position a length of double-sticky tape accurately to the other long edge, with some excess on both ends. Remove the black tape. Holding the excess ends, carefully position over the gap and slowly lower in position. Trim the excess.

Finishing. The various "tex" coverings bear up better for the fuselage than unreinforced films. A single 8-in.-wide piece can do the fuselage. Make overlaps forward of the fin and around the nose. After the fuselage is covered, protect the raw edges around the bolt holes with a large washer, eyelet, or bushing with a broad flange. The #5 Dritz Mighty Snaps packet, size 24, in sewing outlets, contains "posts" well-suited to this application.

Put 1/4-in. dense latex foam (Ace, Sig, etc.) around three sides and fronts of the battery and receiver. The hatch underside can be hollowed out if necessary. Run the antenna down the fuselage on a 1/8-in. balsa stick. The typical switch harness is a nuisance to install, and since a full charge should give three to four hours of operation, a battery-to-receiver adapter is a practical alternative.

Balance and trim. If the saddle is cut to conform to the plans, then the wing has 1° of incidence. Balanced out with the stab at 0-0, there is little tendency to balloon, and the ship must be flown out of its heading. Use a 450 or 500 mAh pack and 1/16-in. sheet lead squares forward of the battery for balancing if necessary.

Balancing at the point shown on the plans with enough stab throw will permit good spins, but it may fly too squirrely at first for low-time pilots. If you're not an experienced pilot, balance the model to begin with at the spar, and trim the elevator for level flight. Keep stab throw at the front to about 3/8 in. each way initially, as the ship is touchy in the pitch axis. After familiarity with it, you may want to increase the throw to obtain true spins, tighter turns, etc.

Use the dual rate setting on your transmitter if available. Tight spins are possible with adequate stab movement and if the center of gravity (CG) is not too far forward. Some of the pictures show a larger fin, but this hampered the spins. The fin size on the plans gives ample directional stability when airspeeds are up. If tip walk is experienced, increase the aileron differential.

If bottom ballast is used, larger grommets can be adjusted vertically on the wing hold-downs to hold the lead onto the fuselage bottom. Be sure the sheet lead weights are cut and folded to maintain the desired balance point.